APPLICATIONS WORKSHOP III-A-1

N76-19448

BEARINGS AND SUSPENSION

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ROTARY-TO-LINEAR CONVERTER

During the session, several rolamite applications were discussed. The first dealt with a rotary-to-linear converter for a pump and was presented by Mr. Mario Di Giovanni, Vice President, Statham Instruments, Inc. The geometrical configuration is illustrated in Figure 1. Torque is applied to one of the rollers, which in turn causes linear motion of the housing which is free to translate. The housing then drives a piston to provide the desired pumping action. The housing is to provide a thrust load of up to 25 pounds and the mechanism is to have a life of about a hundred million cycles. Mr. Di Giovanni's questions were: (1) Does this arrangement violate any rolamite principle? and (2) How can band failures which have occurred on experimental models be prevented?

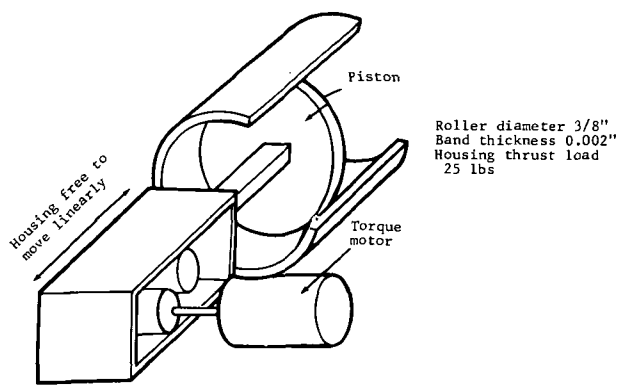

Figure 1. Rotary to Linear Converter

In the discussion that followed, Mr. Di Giovanni's questions were answered essentially as follows. First, the mechanism seems to be a workable configuration and does not violate any rolamite principles of operation. Second, with regard to increasing the life of the band, it was suggested that the band tension be set at a value low enough to place the stress in the band below the endurance limit of the material.

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BAND ATTACHMENT AND TENSION

Mr. Jack Chambers of Statham asked about methods of tensioning the band and of attaching the band to the case. Don Wilkes described some of his techniques which included increasing the thickness of the band at the attachment points and then mechanically attaching the band to the housing. Also, Mr. Wilkes indicated that in his miniature designs he placed thickened tabs on the end of the band. These tabs rested in slots in each end of the housing. To obtain the correct band tension, the band length is carefully designed so that when the band is entwined around the rollers and the tabs are engaged in the slots, the tension is that desired.

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ROTARY BEARINGS

Mr. Ernesto Martin, Communications Satellite Corporation, indicated that his company is interested in applying rolamite to low speed, low level, very long life rotary bearings for space applications. Mr. Martin asked Don Wilkes to comment on his work on rotary bearings. Mr. Wilkes' answer, in summary, was that his work on rotary bearings has been limited. A problem that has never been solved is that in a rotary geometry there is a strong tendency for the band to creep out and chafe against the side of the race. This problem can undoubtedly be overcome if a sufficient development effort is provided.

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FRICTION IN LINEAR BEARINGS

Mr. Norman Czajkowski, Naval Ordnance Laboratory, indicated an interest in linear bearings. He asked for information on the frictional losses in the geometry when the applied force is out of the plane of the roller cluster translational axis. About the only answer to Mr. Czajkowski's question was to refer him to the Sandia Laboratories development report on rolamite, which included sections on side loading and frictional losses in the geometry.

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ROLAMITE GAGE DESIGN

Mr. Charles Hughes, Hughes Engineering Company, described a rolamite gage design which provides an amplified motion of a dial for a very small motion of the rolamite cluster. Figure 2 shows a sketch of the gage.

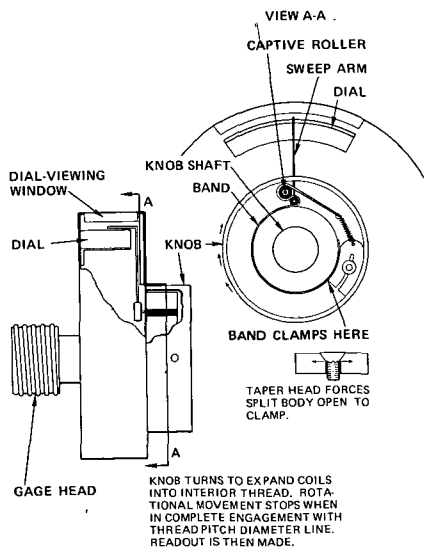

Figure 2. Rolamite Gage

From the description of the device it was not clear where the input to the gage was attached. Mr. Hughes indicated that in his design about 0.002 inch of travel of the roller cluster would provide a dial movement at the readout window of 0.050 inch. The size of gage was not determined.

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